REVIEW

member of the dissertation council

for the dissertation of Al Shanaa Osama on the topic

"SYNTHESIS OF RNA APTAMERS IN CELLS OF YEAST *SACCHAROMYCES CEREVISIAE*"

Submitted for the academic degree of Candidate of Biological Sciences in specialty 1.5.7. Genetics

Relevance of the topic:

The topic of Mr. Al Shanaa Ousama's dissertation is relevant where is devoted to the development of technology for the synthesis of RNA aptamers in *Saccharomyces cerevisiae*. Considering the importance of aptamers in solving the problems of applied biological and environmental research and diagnose diseases and identify proteins associated with certain diseases, the topic of the dissertation is relevant.

Scientific results obtained by the work:

Demonstration the synthesis of RNA aptamer Broccoli in *S. cerevisiae* yeast cells in conjugation with DFHBI-1T fluorophore without decreasing in the viability of yeast producing cells.

Novelty of the research:

In this work, a model system for the synthesis of RNA aptamer in yeast cells was developed. This new direction of research can be promising.

Structure of work:

Mr. Al Shanaa Ousama's dissertation in the English version is 110 pages and contains the traditional sections: introduction, literature review, materials and methods, results, discussion, conclusions, references, supplementary materials, and acknowledgments.

In general the content of the work is good presented.

Introduction section explains the relevance of the study, its aims and objectives, in addition to the practical significance of the work.

Literature descries aptamers, their use and synthesis and *Saccharomyces*, as a model for synthesis of them.

Materials and Methods explain the modern molecular biology methods used in the study.

Results were illustrated in details using figures and a lot of methodical work.

Discussion focuses on the analyzing data.

There are the following questions for the dissertation:

Literature review

- Further comparison between *in vitro* and *in vivo* adapter synthesis was needed.
- What idea do you want to show from Figure 12?
- There are some repetitions between the introduction and the discussion. Please adopt one of them?
- Is there a possibility to discuss your results with similar or close results at the same field?
- The introduction part about yeast is somewhat long and can be shortened.

Material and Methods:

- The purpose for which each of the plasmids listed in Table 2 was used can be added to this table.
- How plasmids with the desired fragments which obtained in this work were prepared before being transformed into bacteria or yeast? Plasmid construction and some other methods are not described in the “Materials and Methods” section.
- What the sequences that are introduced into the transformation reaction of both bacteria and yeast? Are they the same plasmid structures attached in the table 2?
- The fragments' length that will be obtained from the amplification reaction must be mentioned in the primers table or in the body of the text. And what does each pair of primer coded for (the product of amplification)?
- Why did the PGAL-F primer contain a restriction enzyme site while the revers one PGAL-R did not contain a restriction enzyme site?
- The synthesis of the RNA aptamer was accompanied by a change in the transcription level of 115 genes. What was the basis depending on for choosing only the deletion of XRN1exonuclease structural gene was chosen. Do you think that changing in the in the transcription level of other genes will affect the stability of the Broccoli RNA aptamer or the viability of Yeast strain?

Discussion

- Did you notice any differences between using expression cassette based on the use of the SNR52 gene promoter and based on the use of the GAL1 gene promoter?

Conclusions are fully consistent with the results obtained.

The main results of the study were presented and discussed at three international conferences.

Al Shanaa Ousama published in four articles in peer-reviewed scientific journals:

1. Muzaev D.M., Rumyantsev A.M., Al Shanaa O.R., Sambuk E.V. Selective system based on fragments of the M1 virus for the yeast Saccharomyces cerevisiae transformation // Ecological genetics. 2020. - Vol. 18, no. 2. P. 251-263

2. Shanaa O.A., Rumyantsev A., Sambuk E., Padkina M. In Vivo Production of RNA Aptamers and Nanoparticles: Problems and Prospects // Molecules. 2021. Vol. 26, no.5. P. 1422 (1-19)

3. Rumyantsev A., Sidorin A., Volkov A., Al Shanaa O., Sambuk E., Padkina M. Transcriptome Analysis Unveils the Effects of Proline on Gene Expression in the Yeast Komagataella phaffii // Microorganisms. 2022. Vol. 10, no. P. 67 (1-16)

4. Шанаа У.А., Румянцев А.М., Самбук Е.В., Падкина М.В. Синтез флуоресцентного РНК-аптамера Broccoli в клетках дрожжей *Saccharomyces cerevisiae*// Экологическая генетика. 2022. Том 20 (4), стр. 339- 348 (Al Shanaa O., Rumyantsev A.M., Sambuk E.V., Padkina M.V. The synthesis of Broccoli RNA fluorescent aptamer in *Saccharomyces cerevisiae* yeast cells // Ecological genetics. 2022. Vol. 20, no 4. P. 339–348).

In conclusion, I would like to emphasize that Mr. Al Shanaa Ousama's dissertation represents a new and distinctive study. All the objectives of the stuyd were done. Thus, Mr. Al Shanaa Ousama's dissertation on the topic “SYNTHESIS OF RNA APTAMERS IN THE CELLS OF YEAST *SACCHAROMYCES CEREVISIAE*” meets the basic requirements and deserves to be awarded the academic degree of Candidate of Biological Sciences in specialty 1.5.7. Genetics. Paragraphs 9 and 11 of this Procedure were not violated by the dissertation author.

I agree to the inclusion of my personal data in the certification file, posting on the Internet and their further processing.

Member of the dissertation council

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Date 04.12.2023